

sideration of scientific speculations, may help to give that solidity and elasticity to public opinion which is necessary for the rapid advance of science.

If I say that the study of applied mathematics is pre-eminently fitted for the improvement of an acute and correct judgment, I only express a sentiment which, I am sure, is felt by each of my colleagues for his own subject. Where so many attempts are made, let us hope that one may have the desired effect.

### UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The Smith's prizes were adjudged as follows :—The first to Mr. Herman, of Trinity College, the Senior Wrangler; the second to Mr. Yeo, of St. John's College, the Second Wrangler.

Mr. W. F. R. Welden, B.A., of St. John's College, has been nominated to study at the Zoological Station at Naples till June 1, 1882.

Among the subjects for which Downing College offers minor scholarships of from 40*l.* to 70*l.* per annum (examination June 6) are Chemistry, Physics, Physiology, Comparative Anatomy, and Botany. No candidate will be examined in more than three subjects, and two of them must be chosen from the first three named. Great weight will be given to special proficiency in one subject. The scholarships are open to non-collegiate students, or to those who have resided less than one term in any college. In June, also, the College offers one foundation Scholarship in Natural Science, open to all members of the University who have not kept more than six terms.

Prof. Stuart has been elected a Member of the Council of the Senate until November 7, 1884, in the place of Prof. Cayley, resigned.

The Burney prize for the present year is to be given for an essay on the following subject: "The Teleological argument for the existence of an intelligent and moral First Cause, as affected by recent Scientific Investigation."

Mr. MacAlister is lecturing at St. John's College on Methods of Physical Diagnosis for medical students beginning chemical work. Dr. Gaskell is lecturing on Respiration; Mr. Lea will lecture in March on Physiological Chemistry.

THE Chair of Agriculture at the Royal Agricultural College, Cirencester, vacant at the close of the present Session, has been offered to and accepted by Mr. Herbert J. Little, of Coldham Hall, Wisbeach.

### SCIENTIFIC SERIALS

*Journal of the Asiatic Society of Bengal*, vol. 1. part 2, No. 4 (December 21, 1881), contains: W. T. Blanford, notes on an apparently undescribed species of *Varanus* from Tenasserim and notes on other reptiles and amphibia.—T. Wood-Mason and L. de Nicéville, second part of rhopalocerous lepidoptera from Port Blair, Andaman Islands, with descriptions and notes on new or little-known species and varieties (plate 14). This last adds twenty-two species to the fauna.—Geoffery Nevill, description of a new species of *Rostellaria* from the Bay of Bengal (*R. delicatula*).—W. T. Blanford, a numerical estimate of the species of animals, chiefly land and fresh-water, hitherto recorded from British India and its dependencies: Mammals 405, Birds 1681, Reptiles 514, Batrachia about 100, Fishes 1357, Mollusca land and fresh-water, about 1000, Coleoptera, 4780, Hymenoptera 850, Lepidoptera 4620, Hemiptera about 650, Neuroptera about 350, Diptera 500 (?) Orthoptera 350 (?) Arachnida 120, Myriapoda 50, Crustacea, land and fresh-water, 100. A glance at these figures and a comparison of them with the number of species known of the Arthropod orders in Europe will show Anglo-Indian naturalists how much there is yet to be done before the fauna of this great country approaches a complete enumeration.—J. Wood-Mason, on *Eurypus cinnamomeus*, a new species from North-East India (plate 4).

*Annalen der Physik und Chemie*, No. 1, 1882.—Determination of temperature-changes in expansion and contraction of metal wires, and the mechanical equivalent of heat, by H. Haga.—Discussions on the Fourier-Poisson theory of heat-conduction, by W. Hergesell.—On the relation of the freezing-point of salt-solutions to their laws of tension, by F. Koláček.—Remarks on Herr Wullner's note on the spectra of hydrogen and acetylene, by B. Hasselberg.—Fresnel's interference-phenomena treated theoretically and experimentally, by H. Struve.—On the

application of the telephone to determining the resistance of galvanic elements and batteries, by E. Less.—On the existence of a dielectric polarisation in electrolytes, by R. Colley.—On the differential pulley, by C. Bohn.—Theory of refraction on a geometrical basis, by A. Kerber.—On the electric resistance of gases, by E. Edlund.—Remarks on Herr F. Auerbach's second paper on magnetic reaction, by G. Wiedemann.—On an apparatus for representing the phenomena of geysers, by the same.—On the Wheatstone bridge, by K. F. Slotte.

*Archives des Sciences Physiques et Naturelles*, January, 1882.—Experimental researches on the action of poisons on molluscs, by E. Yung.—Memoir on the new registering barometer of the Meteorological Observatory of Lausanne, by H. Dufour and H. Amstein.—The landslip at Elm, by A. Heim.—Researches on the ethers of right tartaric acid, by A. Picet.

*Zeitschrift für wissenschaftliche Zoologie*, vol. xxxvi., part 3 (December 30, 1881), contains:—Dr. G. Haller, on the structure of the Sarcotidae (bird parasites—Dermaleichidae), plates 24 and 25.—W. Mau, on *Scoloplos armiger*, O.F.M., being a contribution to a knowledge of the anatomy and histology of the Annelids, plate 26 and 27.—Elias Metschnikoff, comparative anatomy studies:—(1) Entoderm formation in the Geryonidae; (2) on some stages of the parasite of *Carmarina*, plate 28.—Dr. August Gruber, on *Dimorpha mutans*, a transition form (Mischform) between the Flagellates and Heliozoa, plate 29.—Dr. August Gruber, a contribution to a knowledge of the Amœba, plate 30.—Prof. Herbst, the natural history of the badger.—Prof. A. Bütschli, contribution to a knowledge of the skeleton of the Radiolarians, especially that of the Cyrtidae, plate 31-33.

*Rivista Scientifico-Industriale*, January 15.—On radiophony, by A. Volta.—Two specimens of tourmaline and beryl from Elba (with chromolithographs), and Elban microlite, by A. Corsi.—Insects in winter, by P. Bargagli.—A means of facilitating the preparation of some insects, by P. Stefanelli.

### SOCIETIES AND ACADEMIES LONDON

Royal Society, January 26.—"The Influence of Stress and Strain on the Action of Physical Forces." By Herbert Tomlinson, B.A. Communicated by Prof. W. Grylls Adams, M.A., F.R.S. Part II. Electrical Conductivity. (Abstract.)

The temporary alteration of electrical conductivity which can be produced by longitudinal traction was measured for all the metal wires used in Part I., both in the hard-drawn and annealed condition, and, in addition, for carbon and nickel.

The electrical resistances of all the substances which were examined, were, with the exception of nickel, increased by temporary longitudinal stress. With nickel, however, of which metal a wire nearly chemically pure was at length with difficulty procured (through the kindness of Messrs. Johnson, Matthey, and Co.), the resistance was found to *diminish* under longitudinal stress not carried beyond a certain point; but after this point had been attained, further stress began to increase the resistance. The effect on nickel appears still more remarkable when we reflect that the change of dimensions produced by the stress, namely, increase of length and diminution of section, would increase the resistance.

The specific resistances of all the substances, except nickel and aluminium, were increased by temporary longitudinal stress. With aluminium and nickel the specific resistances were *diminished* by stress not carried beyond a certain limit.

One of the most remarkable features discernible in the results is the similarity of the order of the metals to that of the order of "rotational coefficients" of metals recently given by Prof. Hall (*NATURE*, vol. xxiv. p. 46; abstract of a note read by Prof. E. H. Hall at the meeting of the British Association at York); indeed so striking is the relationship in the case of the metals iron, zinc, aluminium, and nickel, that there would appear to be no doubt that a series of experiments made with a view of determining the effects of mechanical stress and strain on the "rotational coefficients" would be of the greatest value.

Another point to be noticed is that the alteration of the specific resistances of the alloys brass, platinum-silver, and German-silver, is much less than that of the several constituents of these alloys, and at first sight there would appear to be some relation between the alteration of resistance caused by change of temperature and that due to mechanical stress; but it has been proved by these and other experiments that the increase of resistance caused by rise of temperature is in some cases one

hundred times that attending the same amount of expansion by mechanical stress; and, apart from the fact that with nickel and carbon the effects of change of temperature and of longitudinal stress are of an opposite nature, it is evident that the former are to be attributed to other causes than mere expansion.

Compression was proved to produce on the electrical resistance of carbon a contrary effect to that caused by extension; this statement applies to the alteration of specific resistance as well as of the total resistance.

Stress, applied in a direction transverse to that of the current, was also found to produce in several metals both temporary and permanent alterations of resistance of a nature opposite to those resulting from longitudinal traction.

Stress applied equally in all directions by means of an hydraulic press was proved to diminish the resistance of copper and iron; and the experiments showed that the lowering of the temperature of the freezing-point of water can be accurately and readily measured by observations of the change of electrical resistance of a wire.

The total resistance of most metals is permanently increased by permanent longitudinal extension, but with nickel the *total resistance* is permanently *decreased*, provided the extension does not exceed a certain limit: beyond this limit further extension causes the resistance to increase.

The small effects which can be produced by permanent extension, hammering, and torsion on specific electrical resistance were very fully investigated, and are shown in the paper by a series of curves. All the metals examined, except iron and nickel, have their specific resistances increased by strain caused by the above-mentioned processes, provided the strain does not exceed a certain limit, beyond this limit further strain decreases the specific resistance. In the case of iron and nickel, on the contrary, the specific resistance is at first *decreased* and afterwards increased.

The effect on the resistance of annealed steel produced by heating and suddenly cooling was also studied, and it was proved that if the steel be heated to a temperature under "dull red," sudden cooling *decreases* the resistance; whereas if the metal be heated up to or beyond "dull red," sudden cooling *increases* the resistance: the strain, therefore, caused by this process, and that resulting from purely mechanical treatment, are similar as regards their influence on the electrical resistance.

The amount of recovery of electrical conductivity produced by time in wires, which are in a state of strain, is shown in the paper for several metals by a series of curves, and these exhibit most conclusively the superiority of platinum-silver over German-silver when an accurate copy of a standard resistance has to be kept for a long period of time; in fact, of all the metals tested, German-silver showed the most marked recovery of conductivity, and platinum-silver the least.

The recovery of electrical conductivity is in all cases attended with recovery of longitudinal elasticity and of torsional rigidity.

A full examination of the influence of permanent strain on the susceptibility to temporary change of resistance from change of temperature showed that metals may be divided into two classes. In the first of these classes, which includes iron, zinc, and platinum-silver, the strained wire is *most increased in resistance* by rise of temperature up to a certain limit of strain, whilst beyond this limit further strain diminishes the first effect. In the second class, which comprises copper, silver, platinum, and German-silver, the strained wire is *least increased in resistance* by rise of temperature, but that, here again, after a certain point of strain has been reached, the first effect begins to be diminished.

After some trouble, means were found of measuring with considerable accuracy at 100° C. the alteration of electrical resistance due to temporary longitudinal traction, and the experiments led to the belief that the elasticity of iron and steel is not temporarily but *permanently* increased by raising the temperature to 100° C. Subsequently direct observations of the elasticity made in the manner described in Part I., but on shorter lengths of wire, placed in an air-chamber, the temperature of which could be maintained constantly at 100° C., proved beyond a doubt that if M. Wertheim, to whom we owe so much of our knowledge concerning elasticity, had examined the elasticity of iron and steel after these metals, tested at the higher temperature of 100° C., had again cooled down to the lower one, he would have found that what to him *appeared*, in the case of these metals (*Ann. de Chimie et de Phys.*, 3me série, 1844, p. 431) to be a *temporary* increase of elasticity was *really* a *permanent* one, and if the

wires used had been tested several times, first at the higher and then at the lower temperature, he would have also found, *provided sufficient rest after cooling had been allowed*, that the elasticity of both iron and steel is *temporarily diminished* by raising the temperature to 100° C.

The temporary alteration of susceptibility to change of resistance from change of stress, which is effected in the case of nickel by raising the temperature to 100° C., is as remarkable as the susceptibility itself, and the maximum diminution of resistance which could be produced by stress when the metal was at the temperature of the room was actually *more than twice* that at 100° C.

The alteration of electrical conductivity which can be produced by magnetisation was carefully studied, and a full account of the modes of experimenting, of the apparatus employed, and the precautions adopted will be found in the paper. The substances examined were iron, steel, nickel, cobalt, bismuth, copper, and zinc, and in all cases, except that of copper, it was proved that longitudinal magnetisation increases the electrical resistance, whether the substance is in an annealed or unannealed condition.

Of all the metals examined, annealed nickel was by far the most affected by a given amount of magnetising force.

The increase of resistance produced by magnetisation can be very accurately represented by the formula  $\gamma = a + b \cdot \beta$ ; where  $\gamma$  is the increase of resistance,  $a$  the magnetising force,  $\beta$  the induced magnetism, and  $a, b$  constants for the same substance when the same amount of current per unit of area flows through the substance.

In the paper, curves are shown exhibiting the connections between increase of resistance, magnetisation, and induced magnetism. From these curves, and from the fact of the above-mentioned formula holding good, it is assumed that the resistance will go on increasing with the magnetising force even when the latter is so great that further increase of force does not produce perceptible increase of magnetism.

The "circular" magnetisation which any magnetic substance undergoes when a current is conducted through it, seems to have very little or no appreciable effect on the electrical resistance of the substance, so that, if we compare the resistances of iron and platinum, the ratio of the two will be independent of the electromotor employed in the "bridge."

The effects of temporary stress on the alteration by magnetism of the resistance of an iron or nickel wire are of a somewhat similar nature to those caused by the stress on the magnetic inductive capacity of these metals, and the same may be said with regard to the effects of the permanent strains due to extension, torsion, &c. Longitudinal stress which may be made to diminish considerably the susceptibility to alteration of resistance from magnetisation, cannot even when carried to the extent of causing breakage, change the *nature* of the alteration.

There is apparently a close relationship between the "viscosity" of a metal and its specific electrical resistance, and it seems very probable that a full investigation of the former of these two physical properties by the method of torsional vibrations would afford valuable information respecting the latter.

**Zoological Society, February 7.**—Prof. W. H. Flower, F.R.S., president, in the chair.—Mr. Henry Seebohm, F.Z.S., exhibited and made remarks on a series of Goldfinches (obtained at Krasnoyarsk in Central Asia) which presented every form of transition between *Carduelis major* and *Carduelis caniceps*.—The Secretary exhibited, on behalf of Mr. Peter Ingham, F.Z.S., two curious hybrid ducks, obtained on some ornamental water near Darlington.—Mr. St. George Mivart read a paper on the classification and distribution of the *Aluroidea*. He regarded this suborder as best divisible into three families:—(1) *Felidae*, (2) *Viverridae*, (3) *Hyenidae*. The *Felidae* he proposed to subdivide into but two genera, *Felis* and *Cynahurus*, the *Viverridae* into the five subfamilies, (1) *Viverrinae*, (2) *Gali-dictinae*, (3) *Euplerinae*, (4) *Cryptoproctinae*, and (5) *Herpestinae*. The *Hyenidae* were referred to two subfamilies—(1) *Protelinae*, (2) *Hyoninae*. The author regarded *Cryptoprocta* as a true Viverrine animal, attaching but very little importance to dental characters save as discriminating species and genera. The *Gali-dictinae* were arranged to include the genera *Galidictis*, *Galidia*, and *Hemigalidia*, the last-named genus having been instituted for the species previously known as *Galidia olivacea* and *Galidia concolor*.—Mr. W. A. Forbes read a paper on some points in the anatomy of the Indian Darter (*Plotus melanogaster*), and gave a description of the mechanism of the neck in this genus

in connection with the habits of the birds.—A communication was read from Prof. P. Martin Duncan, F.R.S., containing descriptions of some recent corals collected by Mr. J. V. Johnson at a few fathoms' depth in the sea off Funchal, Madeira.—Mr. Stuart O. Ridley read a paper on the arrangement of the Coralliidae, and gave a review of the genera and species of this family, which contains the Red Corals. The description of a new species obtained at the Mauritius was given, as well as of an interesting, but probably not new form, said to come from Japan.

**Physical Society, February 11.**—Annual General Meeting.—Prof. W. Grylls Adams, in the chair.—The president read the report of the council for the past year, from which it appeared that in this, the tenth year of the Society, it was in a highly satisfactory condition, and numbered 331 members.—Sir Charles Wheatstone's papers had been published; Dr. Joule's were soon to be so; and delegates from the Society had taken part in the Electrical Congress at Paris, the Lightning Rod Committee, &c.—The treasurer, Dr. Atkinson, read the audited report of the financial state of the Society; and the following officers were after a ballot declared elected for the ensuing year:—President: Prof. R. B. Clifton, F.R.S.; Vice-president (past president): Sir W. Thomson; Vice-presidents: Prof. G. C. Foster, Prof. F. Fuller, Dr. J. Hopkinson, Lord Rayleigh; Secretaries: Prof. A. W. Remold, Prof. W. Chandler Roberts; Treasurer: Dr. E. Atkinson; Demonstrator: Prof. F. Guthrie; other members of Council: Prof. W. G. Adams, Prof. W. E. Ayrton, Mr. Shellford Bidwell, Mr. Walter Bailey, Prof. J. A. Fleming, Mr. R. J. Lecky, Dr. Hugo Müller, Prof. Osborne Reynolds, Prof. A. W. Rücker; Honorary Member: Prof. G. Quincke.—Votes of thanks were then passed to the Lords Commissioners of the Committee of Council on Education for the use of the meeting hall, to the past-president, Sir Wm. Thomson, to the Secretaries, the Treasurer and Demonstrator, as well as to the Auditors, Mr. Shellford Bidwell, and Mr. E. Rigg. Prof. Adams then resolved the meeting into an ordinary one, and called Prof. Clifton to the chair.—Dr. C. R. Alder Wright, F.R.S., then read a paper on the relation between the electromotive force of a Daniell element and the chemical affinity involved in its action. The author has investigated the causes which lead to a fall of E.M.F. in a Daniell cell when in action. He found the amount of fall for increasing current densities and plotted it in a curve. The fall was slight when pure commercial or amalgamated zinc, or zinc coated with a film of copper was employed. Amalgamated copper plate gave more rapid rates of fall than electro-coated ones. Dilute sulphuric acid round the zinc also gave a less rapid fall than sulphate of zinc solution round it. In all cases no appreciable fall was noticed when the current did not exceed eight micro-amperes per square centimetre of plate surface. With four to six times the density a decrease of EMF from 0.5 to 1 per cent. resulted, and with currents exceeding 3000 micro-amperes in density per square centimetre of surface, the fall exceeded 10 per cent. A series of experiments were made to determine the fall due to change in the density of the solution by migration of the ions causing a stronger zinc and a weaker copper solution. These showed that with nearly saturated zinc sulphate solution (sp. gr. 1.4) and very dilute copper sulphate solution, the maximum fall in E.M.F. is developed, and is less than .04 volts; hence the total fall in E.M.F. due to migration of the ions when moderately strong currents pass is only a fraction of the total fall. It follows that the energy due to the actions taking place in the cell, although wholly manifested in electric action expressible in volt-coulombs, when the current is very small, is not wholly so manifested when the current is stronger; the author expresses this idea by calling the energy manifested in electric action *adjuvant*, and the remainder as *non-adjuvant*. He finds that the major part of the latter energy is absorbed in actions having their seat at the surface of the copper plate, and the rest in actions at the surface of the zinc plate. It is transformed into heat according to Joule's law. As a subsidiary result, it appears that the E.M.F. of a Daniell cell, with zinc and copper sulphate solutions of equal specific gravity, a pure amalgamated zinc plate, and either a freshly deposited copper or an amalgamated copper plate, is a standard subject to less departure from the E.M.F. of other Daniell cells than the Clark's standard elements, which appear to vary one from another. On the other hand, a Clark cell keeps sensibly constant to its original value if properly set up) during a period of months or years, at a constant temperature, whereas a Daniell standard falls from its original value after a few hours or days at most.

**Entomological Society, February 1.**—Mr. H. T. Stainton, F.R.S., president, in the chair.—The President appointed Messrs. Pascoe and Godman and Lord Walsingham as vice-presidents. One new Member was elected.—Mr. E. A. Fitch exhibited a variety of *Strenia clathrata* from Fordingbridge; two larvae of *Anthroceridae* from Galway; and a new Myrmecophilous Coleopteron from India.—Mr. C. O. Waterhouse exhibited specimens of *Macromela Balyi*, Crotch, and of two species of *Pentatomida* from India.—Sir S. S. Saunders exhibited specimens of *Halticella osmicida*, and read some notes on *Euchalcia vetusta*, Duf.—Papers read: Mr. A. G. Butler, on a small collection of Lepidoptera from the Hawaiian Islands; Prof. Westwood, descriptions of insects infesting *Ficus sycomori* and *F. carica*; and Dr. D. Sharp, on the classification of the Adephaga, or carnivorous series of *Coleoptera*.

**Geologists' Association, February 4.**—Annual Meeting.—The following were elected Officers and General Committee for the ensuing year:—President, W. H. Hudleston, F.G.S., F.C.S.; Vice-Presidents: Prof. T. Rupert Jones, F.R.S., Henry Woodward, F.R.S., Jas. Parker, F.G.S., J. Hopkinson, F.G.S.; Treasurer, J. Logan Lobley, F.G.S.; Secretary, J. Foulerton, M.D., F.G.S.; Editor, Rev. J. F. Blake, F.G.S.; Librarian, Ed. Litchfield; Wm. Carruthers, F.R.S., E. Swain, F.G.S., R. W. Cheadle, F.G.S., J. Bradford, W. J. Spratling, F.G.S., J. Drew, F.G.S., W. Fawcett, B.Sc., F. W. Rudler, F.G.S., H. Hicks, F.G.S., H. M. Klaassen, F.G.S., Prof. John Morris, F.G.S., B. B. Woodward, F.G.S.

**Victoria (Philosophical) Institute, February 20.**—A paper on evolution as held by Hæckel and his followers was read by Mr. Hassell. The author considered that one of the great defects of Hæckel's theory was, that it required one to believe in great effects resulting from causes which all that we knew of natural history showed must be insufficient.

**Institution of Civil Engineers, February 14.**—Sir Frederick Bramwell, F.R.S., vice-president, in the chair.—the paper read was on air-refrigerating machinery and its applications, by Mr. J. J. Coleman.

#### EDINBURGH

**Royal Society, January 30.**—Emeritus Professor Balfour, vice-president, in the chair.—At the request of the Council, the Rev. Dr. Cazenove gave an address on the historical (documentary) evidence for the destruction of Herculaneum and Pompeii by the eruption of Vesuvius, A.D. 79. The references to the catastrophe by contemporaneous authors, such as Martial, Plutarch, Statius, Josephus, the younger Pliny, &c., are so vague and general that they might very reasonably have been discredited if the buried cities had not been actually discovered; and it is first from a work of Dion Cassius, published 140 years after the event, that we learn the names of the overwhelmed cities or get any detailed information at all. The inquiry indeed dealt a serious blow to the view held by a certain school, that historical evidence should be based only on contemporary-written records; for in this case it was the non-contemporary writer that gave the precise information.—Prof. Turner described and exhibited certain bones of a Sowerby's whale (*Mesophodon Sowerbyi*) which had been captured in Shetland in May, 1881. From a comparison with the specimen of this very rare species belonging to the Industrial Museum, he concluded that the recently-captured animal was the older, being especially characterised by the presence of a bone running down the centre of the peculiarly elongated snout, and thus filling up what, in the Museum specimen, is a well-marked groove. Probably the ossification had not proceeded far enough in the less mature animal to insure its persistence in the skeleton. The Shetland specimen (a male) also possessed two large teeth on the lower jaw, which, though present in the other, were not large enough to come above the gum. This seemed to indicate a sexual difference.—Prof. Dickson read a paper by Dr. Joseph Bancroft, on respiration in the roots of certain shore plants. His observations referred chiefly to the remarkable rootlets of *Avicennia*. These rootlets grow vertically upwards from the larger roots which extend themselves horizontally in the mud of salt-water creeks. The mud bank around the stem is covered by a brush of such rootlets to a distance of from four to six yards from the bole of the tree. This brush, by entangling debris, protects the bank from destruction by stream or tide. The rootlets are studded with pits or pores emitting powdery matter which consists of cells, and which may be observed floating on the surface of the brackish water of the creek. These pores he regards as corresponding to

lenticels, and he finds that when air is forced into the cut end of a rootlet it issues by the pores. Hence he conjectures that the function of the pores is to contribute to the aëration of the plant, a view coinciding with that held by several botanists as to the lenticels, which they regard as structures affording, like stomata, a communication between the atmosphere and the interior of the plant.—Prof. B. Balfour presented three Latin diagnoses prepared by Dr. J. Müller, Dr. G. Dickie, and Dr. C. M. Cooke, of the lichens, algæ, and fungi collected by him and partly by Dr. Schweinfurth in the Island of Socotra.—Prof. Tait communicated a note by Prof. Piazzzi Smyth, who, with the aid of a very superior spectroscope, has recently discovered that the low-temperature spectrum of oxygen does not consist of five *unique* lines as hitherto believed, but that four at least of these are triple or quadruple, and have the fluted appearance common to other low-temperature gaseous spectra.

## PARIS

Academy of Sciences, February 13.—M. Jamin in the chair.—The deaths of M. Bussey, free Academician, and M. Decaisne, member in Rural Economy, were commented upon. Discourses at the funeral of the latter, by MM. Bouley, Fremy, van Tieghem, and Dechartré.—On the law of deviation of Foucault's pendulum, by M. Bertrand.—On some applications of the theory of elliptic functions, by M. Hermite.—On a new memoir of M. Hirn, "Experimental researches on the relation between the resistance of air and its temperature, by M. Faye. This memoir (noticed in NATURE, vol. xxv. p. 325) M. Faye regards as an important and pregnant scientific event.—On double salts formed by haloid salts of mercury, by M. Berthelot.—Effects of hypnotism on some animals, by M. H. Milne-Edwards. Fowls, &c., hypnotised several times by M. Harting were injured in the nervous system; they were paralysed and died. M. Milne-Edwards thinks the increased aptness of persons often hypnotised, as subjects for demonstration, is a bad sign, and that hysteric persons should not be often so treated.—Proofs of the breaking up of a southern continent during the modern age of the earth, by M. Blanchard. New Zealand and small adjacent islands (Auckland, Maquarie, Chatham, Antipodes, Bounty, and probably others) he regards as the *débris* of this old continent; finding evidence chiefly in the similarity of living things, and also in soundings and in the disappearance of the huge Moas (which he thinks explained by changes in the land, the birds having then been huddled together in small space, and perishing by hundreds). M. Alph. Milne-Edwards passed some strictures on M. Blanchard's conclusions, holding, *inter alia*, that the Antarctic islands (such as Auckland and Campbell Islands) were not formerly connected to New Zealand. M. Blanchard replied.—On the roots of sanitary matrices, by Prof. Sylvester.—Researches on the nitrogen-acids derived from acetones, by M. Chancel.—On the various nervous states produced by hypnotisation in hysteric persons, by M. Charcot. He distinguishes the cataleptic, the lethargic, and the somnambule state.—On a spouting thermal water obtained in the plain of Forez, by M. Laur. Boring to a depth of 502 m. they observed at irregular intervals eruptions of carbonic gas projecting a column of hot water 26 m. for 20 minutes. The vertical tube had a diameter of about 8 inches. Changes of water level accompany the phenomenon.—On the employment of bitumen of Judæa against diseases of the vine, by M. Alric. He quotes information from an account of the journey of Nassiri-Khosan in Syria and Palestine. It is said that phylloxera in Palestine, in the Middle Ages, was suppressed by means of this bitumen. M. Dumas promised an analysis of the substance, a small barrel of which had been sent to the Academy.—Observations of planets 221 Palisa and 222 Palisa at Paris Observatory, by M. Bigourdan.—On the companion of the star  $\gamma$  of Andromeda, and on a new mode of regulation of an equatorial, by M. André. A 6-inch equatorial lately set up by MM. Brunner in Lyons Observatory decomposes clearly (with a magnification of 200) the star named, an effect generally regarded as a test for 8-inch objectives, and which seems only to have been once had before, with aid of a With silvered mirror. In regulation MM. Brumer use a spirit level and a nadir ocular.—On the distribution, in the plane of roots, of an algebraic equation whose first member satisfies a linear differential equation of the second order, by M. Laguerre.—On singular points of differential equations, by M. Poincaré.—On the forms of integrals of certain linear differential equations, by M. Picard.—On a case of reduction of  $\Theta$  functions of two variables to  $\theta$  functions of one variable, by M. Appell.—On quadratic forms with two series of variables, by M. Le Paige.—On

the divisibility of certain quotients by powers of a certain factorial, by M. André.—On shock of elastic bodies, by M. Pilleux. He describes some instructive experiments with ivory cubes hung in a row, and an ivory ball allowed to impinge on them.—Electric actions in similar conducting systems, by M. Deprez.—On the electric transport of force to great distances, by M. Deprez. With small modified Gramme machines weighing about 100 kg. he has got a useful work of 37 kw. with an interposed resistance of 786 ohm, representing 78.6 km. of ordinary telegraph wire.—On methods of comparison of induction coefficients, by M. Brillouin.—On the generality of the electrochemical method for figuration of equipotential lines, by M. Guéhard.—Hydrodynamic experiments; imitation, with liquid currents, of the phenomena of electromagnetism, by M. Decharme. He uses, instead of the pulsating or vibrating bodies of Bjerknes (in water), liquid currents, continuous or interrupted, acting in air or water. He describes a hydro-electromagnet with interrupted currents.—Polarimeter with ordinary light, by M. Laurent. He introduces into an ordinary polarimeter, between the tube and the analyser, a Soleil compensator, with prismatic quartz plates.—On oxychlorides of magnesium, by M. André.—On oxychlorides of sulphur, by M. Ogier.—Action of cyanide of potassium on trichloracetate of potassium, by M. Bourgoin.—On the heat of formation of ferricyanhydric acid, by M. Joannis. He arrives at the number +280.5 cal.—On galactine, by M. Muntz. This is a gum which he extracts from grain of lucerne; it is marked by high dextrogyrous rotatory power, and the property of giving, with dilute acids, the products of decomposition of milk-sugar. Leguminous grains, especially, contain large quantities of it.—On aconitines, by M. Guinocet.—On hieratite, a new mineralogical species, by M. Cossa. This is named from *Hiera*, the Greek for Vulcano Island (Lipari), where the substance is found near the fumaroles of the crater. The composition agrees with that of fluosilicate of potassium, a salt not previously found among natural products.—Atlantic actinia from dredges of *Le Travailleur*, by M. Marion.—On fossil Echinida of the island of Cuba, by M. Cotteau.—On asterophyllites, by M. Renault.—On the nature of spherulites forming an integral part of eruptive rocks, by M. Lévy.—On the discovery of marine carboniferous formation in Upper Alsace, by M. Bleicher.—On the anomalies of the atmospheric pressure in January and February, 1882, by M. Renou. The sky was overcast continuously for fifteen days (January 11 to 26); the bright days were warm, the dull days cold (contrary to what usually occurs in winter). From January 9 to February 7 no rain fell. The Marne and Seine were very low and extraordinary clear.

## VIENNA

Imperial Institute of Geology, January 24.—Dr. Tirus, on the Scoglio of Brusnick in Dalmatia.—A. Rzehak, on oncopora, a new genus of Bivalvæ.—Th. Fuchs, on the pelagic fauna and flora.—C. M. Paul, on the region of Sanok; and Lupkow, in Galicia.—M. Vacek, on the geology of the Nousberg.

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